SAP II

SAP Communication Protocol
For
SAP Series Products

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1. Introduction

The Magenta Series SAP products enable transmission of Video signals, Stereo Audio signals as well as RS 232 signals over CatX cable.
The SAP protocol allows bi-directional serial sessions to be established between a transmitter unit and a receiver unit typically used between a control application and a display monitor for control and feedback.

The SAP series of Magenta products (MultiView and Infinea) are typically used in a daisy chain environment or with the Magenta MultiView Octet and Mondo III SAP Matrix switch where multiple devices are connected together and it is desired to have full duplex, bi-directional serial control. Normally, due to the RS232 specification, transmit only simplex serial communication would be possible.

The SAP series communication protocol built into the SAP series products addresses this by using session based communication between a transmitter device and receiver device. Once a session has been established, RS232 data is transparently passed between the control application and end point device.
When all communication is finished, the session is closed and no further communication occurs.

In order to manage the serial data sessions, special control commands are sent to the transmitter and receiver. Units are shipped with a simple instruction set called SAP I. These commands are shown in Section 2 and will suffice for most applications.

However, SAP I commands may be interpreted by a control application or display device which can cause data errors.

Magenta has developed the SAP II protocol as a workaround to this. The SAP II protocol is similar to the Hayes Modem control protocols and will not interfere with standard RS232 data streams. Section 3 provides details on how to use the SAP II protocol.

It should be noted that all SAP units require a unique numeric address in order to communicate with each other. This is set via a software GUI, LCD setting or an internal dipswitch*. Reference the user manual for the specific device on how to do this.

> * For units that utilize a rotary or dip switch to set the SAP address, the dipswitch address takes precedence over one set by the software GUI utility. For the software GUI address setting to take effect, please set the dipswitch address to zero.

2. SAP I Protocol (Default)

All commands are sent to the units via an external serial control application and input via the serial COM port of the unit. ***NOTE: The Infinea M-HDX products do not support SAP I protocol.***

SAP I Transmitter Command Protocol

Read Transmitter Source Address

Command: **<Ctrl-A><CR>**
Response: Address=a<LF><CR>

a = Source-address of the SAP transmitter.
Normally this is set to 0.

Set Transmitter Source Address

Command: **<Ctrl-S>a<CR>**
Response: none

a = Source-address of the SAP transmitter.
Normally this is set to 0, but can also be 1..255.

Note: To use this command, the address DIP-switch on the transmitter must be set to 0. If the DIP-switch is non-zero, this command will have no effect and the address will be determined by the DIP-switch setting.

Set Receiver Destination (Device) Address

This command establishes a "session" with the specified device.

Command: **<Ctrl-D>d<CR>**
Response: none

d =Destination-address of the SAP-receiver desired for an active "session".
0 = Broadcast session to all receivers.
1...255 = Session with a specific receiver.

SAP I Receiver Command Protocol

Get SAP-RX Device Address

Command: **<Ctrl-A><CR>**
Response: Address=a<LF><CR>

a =Device address of the SAP receiver.

Set SAP-RX Device Address

Command: **<Ctrl-S>d<CR>**
Response: none

d = Device-address of this SAP-receiver.
0 = Broadcast mode:
Receives data for all sessions.
Responds only to broadcast (address=0) sessions.
1...255 = Specific receiver address:
Receives data for broadcast (Address=0) sessions.
Responds only to specific (address=mine) sessions.

2. SAP I Protocol (Default), cont.

Receiver PING
This is used for "health monitoring" of the receiver (and transmitter). If the command is successful, it will confirm that both the transmitter and receiver are powered, connected, and operating properly. This is sent from the transmitter.

Command: **<Ctrl-E>x<CR>**
Response: @<CR>x

x = Any ASCII printable character. It does not have to be the letter "x".

Note: The <Ctrl-E> may be different if it has been modified by the "Set PING command character" command below.

The response is actually a 2-part message:

1) The "@<CR>" indicates the SAP-TX module accepted and processed the PING command.
2) The "x" character, which comes shortly thereafter, confirms that the SAP-RX module received the PING command and has echoed back the chosen ASCII character.

There could be a delay before receiving the "x", but it should never exceed 250ms. The control system should implement a timeout. If the "x" doesn't arrive within the 250ms period, then the receiver (or cable) is faulty. The "<Ctrl-E>x<CR>" string is not passed through the receiver to the attached device.

Set SAP-TX PING command character
This command allows changing the PING command from <Ctrl-E> (the factory default value) to something else, as this is sometimes necessary in certain applications. It is also possible to effectively mask (disable) the PING command.

To set the PING command character: Command: **<Ctrl-D>Pd<CR>**
Response: none

To read the PING command character: (assuming it's currently set to <Ctrl-E>) Command: **<Ctrl-D>?<CR>**
Response: PE<CR>

d =The control-character chosen as the PING command. This is a printable ASCII character in the range of "A" to "Z" and "[", "\", "]", "^" or "_" (see a standard ASCII table), which is then converted to its equivalent control-character value internally. This allows the PING command to be set to any control character from <Ctrl-A> to <Ctrl-_> (or 01h through 1Fh – **SEE NOTE BELOW**).

For example, to set the PING command to <Ctrl-X>, use this sequence:
<Ctrl-D>PX<CR>

To set the PING command back to <Ctrl-E> (the default), use this sequence:
<Ctrl-D>PE<CR>

NOTE: The PING command should not be set to <Ctrl-A>, <Ctrl-D> or <Ctrl-S>, as these are reserved for other commands. The result will be that the PING command will be hidden (masked) by the other reserved function, effectively disabling the PING command. If it is desired to mask the PING command, then set it to a reserved command such as <Ctrl-A>, <Ctrl-D> or <Ctrl-S>.

3. SAP II Protocol

All commands are sent to the units via an external serial control application and input via the serial COM port of the unit.

SAP-II (TX/RX) Command Protocol Details

For backwards compatibility, both SAP I and SAP II can coexist. However if SAP I does interfere with serial communications, it can be disabled by the ATS1=0 command (detailed later in this section).

In order to enter the COMMAND mode of SAP II, a special character sequence is sent form the control application in use to the SAP device.
This is composed of a brief period of silence (250ms), followed by three (3) "+" characters. Once COMMAND mode has been successfully entered the unit will respond with an OK> prompt.
An example is shown below:

Sent to SAP-TX/RX:	[.....silence.....] +++
Response from SAP-TX/RX:	OK>

Note that no terminating carriage return is necessary. COMMAND mode will be entered as soon as the last "+" is received. See notes below.

1) The [silence] period is 250ms.
2) The maximum time between "+" characters is 2 seconds.
3) If the "+++" sequence is not recognized for any reason (not enough [silence] period, or too much time between "+"), then all the "+" characters are sent through to the other end.

All commands while in command mode begin with the letters "AT", and consist of printable ASCII characters. Case is ignored, and must end with a single <CR> (do not prepend a <LF> character to the <CR> as this will cause errors). When the command processor is ready to accept another command it will transmit the "OK>" prompt sequence. If there is an error or the command is not recognized, an "ER>" prompt will be shown.

Data sent while in COMMAND mode is not echoed, unless ECHO is turned on (see Echo command later in this section).
To exit COMMAND mode, enter the exit command: "ATO<CR>". (Letter "O", not number zero "0".)

SAP-II commands are entered at the transmitter's or receiver's local serial port. However, often it's convenient or necessary to control functions in the receiver from the transmitter side. To do this the "!" command prefix allows commands to be sent through the transmitter to the receiver. Receivers cannot change transmitter functions though.

Notes on the "!" command :

1) The "!" prefix character marks the rest of the command-line as "send to receiver".
2) The "!" prefix will be ignored if entered at the receiver end.
3) When the receiver is executing a command, all responses (even the "OK>" prompt) originate from the receiver. Receivers with an address of 0 will not respond to AT commands but they will process them.
4) Before using the "!" remote-control feature, a data-session must first be established with the "ATD" command (or <Ctrl-D> command from the SAP-I protocol set). When using a group of Octets on the transmitter side, the AT command address must be configured ("ATT" command) as well. The AT command address defaults to 0.

3. SAP II Protocol, cont.

SAP-II Commands

The Magenta series of products that feature the SAP option are the MultiView series transmitters and receivers designated as SAP enabled, the Octet 1x8 transmitter/DA, the Infinea SAP series of UTP/fiber DVI extenders and the Mondo III SAP matrix switch.

Not all SAP II commands are supported by all devices. Below is a table that details each command and which device supports it. This is also listed next to each command heading in the following pages.

		MultiView Series							Infinea Series			
Description	**SAP II Command**	**XRTx**	**AK600DP**	**AK1200P**	**XR2000DP**	**NEC600**	**Octet**	**Mondo III**	**Infinea TX**	**Infinea RX**	**M-HDX Tx****	**M-HDX Rx****
Destination Address	ATD	Y	N	N	N	N	Y	Note1	Y	N	N	N
Source Address	ATA	Y	Y	Y	Y	Y	Y	Note2	Y	Y	N	N
Character Echo	ATE	Y	!*	!*	!*	!*	Y	Y	Y	!*	Y	Y
Exit command mode	ATO	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Set Serial Baud Rate	ATB	Y	Y	Y	Y	N	Y	Note3	Y	Y	Y	Y
Get SW Version	ATI	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Octet DDC	ATY	N	N	N	N	N	Y	N	N	N	N	N
Octet Panel button lock/unlock	ATL	N	N	N	N	N	Y	N	N	N	N	N
Octet Set AT command device	ATT	N	N	N	N	N	Y	N	N	N	N	N
Reset	ATZ	N	N	N	N	N	Y	N	N	N	Y	Y
Audio Control	ATG	Y	Y	Y	Y	Y	Y	Y	N	N	N	N
SAP I mode	ATS1	Y	Y	Y	Y	N	Y	N	Y	Y	N	N
Sync mode	ATS8	N	N	N	N	Y	Y	N	N	N	N	N
Coupling mode	ATS9	N	N	N	N	N	Y	N	N	N	N	N
DC Restore mode	ATS10	N	N	N	N	N	Y	N	N	N	N	N
H-Sync Polarity	ATS11	N	N	N	N	Y	N	N	N	N	N	N
V-Sync Polarity	ATS12	N	N	N	N	Y	N	N	N	N	N	N
Clamp Mode	ATS13	N	N	N	N	Y	N	N	N	N	N	N

Notes:

* This command is not supported directly on the receiver, but the "!" prefix may be used at the transmitter to enable/disable this mode.
** The Infinea M-HDX series uses the SAP II protocol primarily to change baud rate settings. The other commands supported are for diagnostics and are not necessary for normal operation. The M-HDX series does not require SAP II protocol for RS232 communication.

1. The Mondo III SAP command ($SCC) is used for this command. See the Mondo III user manual for details
2. The Mondo III SAP does not support this command. However the "!" prefix may be used.
3. The Mondo III SAP command ($SPC) is used for this command. The "!" prefix may be used also. See the Mondo III user manual for details

3. SAP II Protocol, cont.

SAP-II Commands

SAP-II Commands are generally entered at the SAP-TX serial port (termed “local port”). However, some commands can be sent from the TX end to the RX (remote) end, or can be entered directly at the RX end as well. A command that can affect the remote end (RX) will have a “!” prefix character, but this is only available where noted. The “AT” prefix is shown in all commands.

ATD - Destination Address (XRTx, Octet, Infinea Tx)

This command is used to establish a session with an individual receiver or broadcast to all receivers

Set destination:	Command:	ATDn**<CR>**
	Response:	OK>
Read setting:	Command:	ATD? **<CR>**
	Response:	Dn**<LF><CR>**OK>

n = Destination device (SAP-RX module) to create a session with.
0 = Broadcast mode: All receivers will see session data. Only “0” receivers can respond.
1..254 = Session mode: Only receivers with this address will receive data or respond.

Octet only: device address = Octet Unit address * 256 + receiver address. To broadcast to all receivers, use the “Address wildcard” command (*) in place of the device address.

Note: This is the equivalent of the SAP-I format “<Ctrl-D>” command.

ATA - Source Address (XRTx, Octet, Infinea Tx, AK600, AK1200, XR2000, NEC600, Infinea Rx)
AT!A - Source Address on receiver sent from transmitter

This command is used to set or read a SAP device address.

Set source address:	Command:	ATAn**<CR> or AT!An<CR>**
	Response:	OK>
Read setting:	Command:	ATA? **<CR> or AT!A?<CR>**
	Response:	An**<LF><CR>**OK>

n = Device Address (0 – 255).

Tx address details: Normally this is set to 0, but can also be 1..255.
Rx address details:
0 = Broadcast mode:
Receives data for all sessions.
Responds only to broadcast (address=0) sessions.
1...255 = Specific receiver address:
Receives data for broadcast (Address=0) sessions.
Responds only to specific (address=mine) sessions.

SAP-TX/RX Note: To use this command, the address dip switch on the transmitter or receiver must be set to 0. If the DIP-switch is non-zero, this command will have no effect and the address will be determined by the DIP-switch setting.

Note: This is the equivalent of the SAP-I format “<Ctrl-S>” command.

3. SAP II Protocol, cont.

SAP-II Commands, cont.

ATE - Character Echo (XRTx, Octet, Infinea Tx, Infinea M-HDX)
AT!E—Character Echo mode on receiver sent from transmitter

Enables/disable character echo mode. The Default is disabled.

Disable echo:	Command:	ATE0**<CR> or AT!E0<CR>**
	Response:	OK>
Enable echo:	Command:	ATE1**<CR> or AT!E1<CR>**
	Response:	OK>
Read setting:	Command:	ATE? **<CR> or AT!E?<CR>**
	Response:	E0**<LF><CR>**OK> or E1**<LF><CR>**OK>

ATO – Online Mode XRTx, Octet, Infinea Tx, AK600, AK1200, XR2000, NEC600, Infinea Rx, Infinea M-HDX)
This command exits COMMAND mode and restores normal RS232 communications

Go online:	Command:	ATO**<CR>**
	Response:	(none – port returns to data mode immediately)

ATB - Set Serial Baud-Rate (XRTx, Octet, Infinea Tx, AK600, AK1200, XR2000, Infinea Rx, Infinea M-HDX)
AT!B—Set Serial Baud Rate on receiver sent from transmitter

This command is used to set or read a SAP device baud rate setting.

Set port baud-rate:	Command:	ATBn**<CR> or AT!Bn<CR>**
	Response:	OK>
Read port baud-rate:	Command:	ATB? **<CR> or AT!B?<CR>**
	Response:	Bn**<LF><CR>**
		OK>

n = Serial port baud rate selection:

1 = 1200 baud	5 = 14400 baud
2 = 2400 baud	6 = 19200 baud
3 = 4800 baud	7 = 38400 baud
4 = 9600 baud *(default)*	8 = 57600 baud
	9 = 115200 baud

Notes:
When changing the baud rate of a port you are using to send this command, the “OK>” response string is sent at the current baud-rate. Immediately after the “>” the serial-port baud rate will be changed to the new baud rate.

While it IS possible to have different serial port baud rates at the TX and RX ends, there is limited buffering capability – so consider the potential for data-loss when attempting to achieve higher throughput than the slowest port (either TX or RX side) can physically handle. Sending data from a slower port to a faster port is always safe at any speed. Currently, there is no software-handshaking (Xon/Xoff) feature available.

The NEC Rx uses a dedicated comm port for setup and bootloader activities since the display is connected directly to the SAP module through an internal connector. The comm-port baud rate command only affects the UART which communicates with the display through the internal connector. It should be set to 9600 bps according to the current NEC display port spec. Currently the externally-accessible “setup” comm-port baud-rate is fixed at 9600 bps.

3. SAP II Protocol, cont.

SAP-II Commands, cont.

ATI - Get software version (XRTx, Octet, Infinea Tx, AK600, AK1200, XR2000, NEC600, Infinea Rx, Infinea M-HDX*)
AT!I get software version from receiver sent from transmitter

This commands retrieves the Firmware P/N and version information.

Read S/W partnumber:	Command:	ATI4**<CR> or AT!I4<CR>**
	Response:	swpnstring**<LF><CR>** OK>
swpnstring =	Software part number and version.F For example: "94412340102" Which means "P/N 944123401 revision 02"	
Read S/W version string:	Command:	ATI5**<CR> or AT!I5<CR>**
	Response:	versionstring**<LF><CR>** OK>
versionstring =	Firmware version information, in the form of: "V01.01"	

* For Infinea M-HDX, 4 parameters are returned:
1 = Unit Serial Number
2 = Firmware Part Number
3 = Firmware Version
4 = Optic Module serial number

ATZ - Reset (XRTx, Octet, AK600, AK1200, XR2000, NEC600, Infinea M-HDX)
AT!Z—Reset sent from transmitter to receiver

This command will reset parameters in a SAP device .

"Soft" reset:	Command:	ATZ0**<CR> or ATZ!0<CR> (or ATZ<CR>)**
	Response:	OK>**<LF><CR>**
"Hard" reset:	Command:	ATZ1**<CR> or AT!Z1<CR>**
	Response:	OK>**<LF><CR>**

Note: A soft reset will re-initialize all device settings except the source address, destination address (Tx or Octet only) and the baud rate. A hard reset will re-initialize all device settings including the source address, destination address (Tx or Octet only) and the baud rate. In some cases this may cause loss of communication unless settings are restored to their current values. **Use with caution.**

ATS1 - SAP-I Protocol Enable (SAP-Tx, SAP-Rx, SAM-Tx, SAM-Rx & Octet)
AT!S1 SAP-I Protocol Enable at receiver form transmitter

This command is used to disable/enable the SAP I protocol

Disable SAP I:	Command:	ATS1=0**<CR> or AT!S1=0<CR>**
	Response:	OK>
Enable SAP I:	Command:	ATS1=1**<CR> or AT!S1=1<CR>**
	Response:	OK>
Read setting:	Command:	ATS1? **<CR> or AT!S?<CR>**
	Response:	S1=[0 or 1]<LF<CR>

3. SAP II Protocol, cont.

SAP-II Commands, cont.

SAP-II Audio Control Commands

ATG - Audio Gain Setting (XRTx, Octet, AK600, AK1200, XR2000, NEC600)
AT!G - Set Audio Gain at receiver from transmitter

The SAP-TX and SAP-RX modules have digital audio-codecs which provide a range of gain adjustments. This can be used in some cases to adjust audio signal levels to help normalize output levels for different receiving equipment (displays, amplifiers, etc.).

Set left-channel gain:	Command:	ATGLg**<CR> or** AT!GLg**<CR>**
	Response:	OK>
Get left-channel gain:	Command:	ATGL? **<CR> or** AT!GL? **<CR>**
	Response:	GLg**<LF><CR>** OK>
Set right-channel gain:	Command:	ATGRg**<CR> or** AT!GRg**<CR>**
	Response:	OK>
Get right-channel gain:	Command:	ATGR? **<CR> or** AT!GR? **<CR>**
	Response:	GRg**<LF><CR>** OK>
Set both channels' gain:	Command:	ATGBg**<CR> or** AT!GBg**<CR>**
	Response:	OK>
Get both channels' gain:	Command:	ATGB? **<CR> or** AT!GB? **<CR>**
	Response:	GLg**<LF><CR>** GRg**<LF><CR>** OK>

g = Gain setting (either 0db or some amount of attenuation):
0 = 0db (no change)
1 = -1dB
2 = -2dB
...
31 = -31dB
M = Muted
U = Un-muted

Note: Gain settings entered at the TX will affect the transmitter's codec. Gain settings for the remote (RX) end using the "!" prefix will affect the receiver's codec. It DOES make a difference which end you are adjusting.

Application Note: Generally, gain adjustments at the transmitter serve to compensate for differing source-signal levels. Gain adjustments at the receiver serves to compensate for differing speaker/ amplifier performance levels. Muting can be done at either end and results in a global (all receivers connected to this transmitter) or selective (per receiver) mute function.

3. SAP II Protocol, cont.

SAP-II Commands, cont.

ATY – DDC (Octet)

The Octet DDC Copy and restore operations may be activated with this command.

Restore DDC:	Command:	ATY0**<CR>**	*(default)*
	Response:	OK>	
Copy DDC:	Command:	ATY1**<CR>**	
	Response:	OK>	

Note: You may NOT use the "!" prefix. This command is not supported at the RX end.

ATL – Lock Panel Buttons (Octet)

The Octet Panel Button lock / unlock operations may be activated with this command.

Unlock Panel:	Command:	ATL0**<CR>**	*(default)*
	Response:	OK>	
Lock Panel:	Command:	ATL1**<CR>**	
	Response:	OK>	

Note: You may NOT use the "!" prefix. This command is not supported at the RX end.

ATT – Set AT Command Device Address (Octet)

This command selects the Octet device that will receive and process commands when multiple devices are connected in a cascade arrangement.

Set AT Command Address:	Command:	ATTn**<CR>**
	Response:	OK>

n = Device Address (0 – 255).

Note: You may NOT use the "!" prefix. This command is not supported at the RX end.

Note: Only the device whose source / unit address matches the device address parameter will process and respond to commands with one exception: The 'ATT' and 'ATD' commands will *always* be processed by *all* devices regardless of their address.

Note: When querying receivers through an Octet, both the destination address ("ATD" command) *and* the AT command address ("ATT" command) must be configured correctly otherwise data will not return to the controller. The AT command address defaults to 0 when returning to data mode.

3. SAP II Protocol, cont.

SAP-II Commands, cont.

ATS8 - Sync. Mode (Octet, NEC600)

The Octet & NEC600 Sync modes may be activated with this with this command.
See respective user guides for an explanation of the sync modes.

"Agile" sync. mode:	Command:	ATS8=0**<CR>**
	Response:	OK>
"Fixed" sync. mode:	Command:	ATS8=1**<CR>**
	Response:	OK>

ATS9 - Coupling Mode (Octet)

The Octet AC/DC coupling mode may be activated with this with this command.
See Octet user guide for an explanation of the AC/DC coupling modes.

D/C coupled:	Command:	ATS9=0**<CR>**
	Response:	OK>
A/C coupled:	Command:	ATS9=1**<CR>**
	Response:	OK>

ATS10 - D/C Restore (Octet)

The Octet DC Restore mode may be activated with this with this command.
See Octet user guide for an explanation of DC Restore.

D/C restore Mode 0.	Command:	ATS10=0**<CR>**
	Response:	OK>
D/C restore Mode 1	Command:	ATS10=1**<CR>**
	Response:	OK>
D/C restore Mode 2	Command:	ATS10=2**<CR>**
	Response:	OK>

ATS11 - H-sync. polarity / fixed sync. mode only (NEC600)
AT!S11 - H-sync. polarity / fixed sync. mode only

The NEC600 Horizontal Sync polarity may be changed with this with this command.
See NEC600 user guides for an explanation of this.
Requires ATS8=1 or fixed sync mode enabled setting.

Negative	Command:	ATS11=0**<CR> or AT!S11=0<CR>**
	Response:	OK>
Positive	Command:	ATS11=1**<CR> or AT!S11=1<CR>**
	Response:	OK>

NOTES3. SAP II Protocol, cont.

SAP-II Commands, cont.

ATS12 - V-sync. polarity / fixed sync. mode only (NEC600)
AT!S12 - V-sync. polarity / fixed sync. mode only

The NEC600 Vertical Sync polarity may be changed with this with this command.
See NEC600 user guides for an explanation of this.
Requires ATS8=1 or fixed sync mode enabled setting.

Negative	Command:	ATS12=0**<CR> or AT!S12=0<CR>**
	Response:	OK>
Positive	Command:	ATS12=1**<CR> or AT!S12=1<CR>**
	Response:	OK>

ATS13 - Clamp mode (NEC600)
AT!S13 - Clamp mode

The NEC600 Video Clamp mode may be changed with this with this command.
See NEC600 user guides for an explanation of this.

Mode 0.	Command:	ATS13=0**<CR> or AT!S13=0<CR>**
	Response:	OK>
Mode 1	Command:	ATS13=1**<CR> or AT!S13=1<CR>**
	Response:	OK>
Mode 2	Command:	ATS13=2**<CR> or AT!S13=2<CR>**
	Response:	OK>
Mode 3	Command:	ATS13=3**<CR> or AT!S13=3<CR>**
	Response:	OK>

ATQ - Audible Alert (pager) mode (NEC600)
AT!Q - Audible Alert (pager) mode

The NEC600 receiver features a built in audio alert setting that may be used to locate a specific receiver by turning the Audible Alert on. When this setting is enabled, the receiver will emit a

Audible Alert Off	Command:	ATQ0**<CR> or AT!Q0<CR>**
	Response:	OK>
Audible Alert On	Command:	ATQ1**<CR> or AT!Q1<CR>**
	Response:	OK>

NOTES

SAP-II Commands, cont.

SAP-II Video Control Commands

Note: currently the following commands are only supported in the NEC 600 receiver.

ATVE - Set EQ adjustment—simulates the EQ knob on receiver unit (NEC600)
AT!VE - Set EQ adjustment at receiver from transmitter.

Set EQ adjustment:	Command:	ATVEn**<CR> or** AT!VEn**<CR>**
	Response:	OK>

n = Equalization setting as a percent of maximum receiver range; I.e 0=0 feet, 50= 1/2 of receiver rating, 100=full EQ on).

Get EQ adjustment:	Command:	ATVE?**<CR> or** AT!VE?**<CR>**
	Response:	n**<LF><CR>**
		OK>

ATVR—Set skew value, red. (NEC600)
AT!VR-Set skew setting at receiver from transmitter
ATVG—Set skew value, green. (NEC600)
AT!VG-Set skew setting at receiver from transmitter
ATVB —Set skew value, blue. (NEC600)
AT!VB-Set skew setting at receiver from transmitter

Set Red channel slew value:	Command:	AVRs**<CR> or** AT!VRs**<CR>**
	Response:	OK>
Set Green channel slew value:	Command:	AVGs**<CR> or** AT!VGs**<CR>**
	Response:	OK>
Set Blue channel slew value:	Command:	AVBs**<CR> or** AT!VBs**<CR>**
	Response:	OK>

s = Skew setting in nanoseconds (1-65)

Get Red channel slew value:	Command:	AVR?**<CR> or** AT!VR?**<CR>**
	Response:	s**<LF><CR>**
	Response:	OK>
Get Green channel slew value:	Command:	AVG?**<CR> or** AT!VG?**<CR>**
	Response:	s**<LF><CR>**
	Response:	OK>
Get Blue channel slew value:	Command:	AVB?**<CR> or** AT!VB?**<CR>**
	Response:	s**<LF><CR>**
	Response:	OK>

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